CARNIVOROUS PLANT NEWSLETTER

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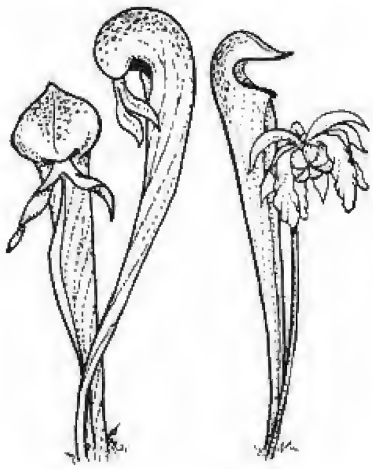

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Cover: *Byblis* 'Goliath.' See article on page 12. Photograph by Brian Barnes.

Back Cover: *Sarracenia* 'Reptilian Rose' mature pitchers. See article on page 12. Photograph by Travis Wyman.

Carnivorous Plant Newsletter is dedicated to spreading knowledge and news related to carnivorous plants. Reader contributions are essential for this mission to be successful. Do not hesitate to contact the editors with information about your plants, conservation projects, field trips, or noteworthy events. Contributors should review the "Instructions to Authors" printed in the March issue of each year. Advertisers should contact the editors.Views expressed in this publication are those of the authors, not the editorial staff.

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Contents

Letter from the Editor

As the new Managing Editor of CPN I want to acknowledge and thank Barry Rice, Jan Schlauer and Steve Baker for over a decade of incredibly hard work in bringing CPN up to the professional standards we see today. It was a huge job for three people to pull off for so long and so well. Recently Jan and Barry decided to bring more people into the process. Creating a Managing Editor position and bringing in more editors and others will make it possible to produce an even finer work. Fortunately Barry and Jan have not left the fold and will still be doing many of the things they did before, only with more help.

For over 35 years, CPN has been a top resource for CP growers and scientists alike. At one time it was the only way to get information out to a large audience of enthusiasts, and for many, it was their only source of information. Now, we are in the middle of an information explosion. The web allows writers from all over the world to publish their thoughts and experiences. In the middle of all this, there is still CPN. While the web is a "wild west," CPN sets a standard of excellence for both peer-reviewed scientific articles, and articles from our readers' experiences and observations, that the web does not consistently bring. It is THE place to register your cultivars and share information with thousands of growers worldwide.

We have already moved to a new structure involving more people with diverse skills from around the world. Further changes to CPN should not be made in a vacuum. We need your input and articles. What can we do to make CPN better? We need your experiences to fill CPN's pages with articles that entertain and enlighten. Tell us your growing secrets. Show us how you have found conventional wisdom on growing our plants is wrong, or share a new technique that makes life easier and our plants grow stronger and faster.

Please contact me with your input on how you would like to see CPN changed over the coming year, and work on those articles.

Lastly, I want to give a special thanks to Barry Rice for his hard work, guidance and patience over the last few months as I became familiar with the inner workings of CPN.

Thank you,

Stephen Davis
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A NEW VARIETY OF *DROSERA SPATULATA* (DROSERACEAE) FROM SARAWAK, BORNEO

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Keywords: New taxa: Borneo, *Drosera spatulata*.

Received: 2 January 2008

Introduction

The Bako National Park (Taman Negara Bako) was founded in 1957, making it the oldest national park in Sarawak. It covers an area of 2.727 ha (6.738 acres) at the tip of the Muara Tebas Peninsula (Good, 1988). This rather small national park is familiar to many carnivorous plant enthusiasts due to the various species of *Nepenthes* that grow within it, and its close proximity to Kuching, the state capital.

The majority of the park is situated on a relatively flat-topped sandstone plateau (the so-called "Bako Sandstones" of possible Eocene to early Miocene age), which slopes from over 250 m a.s.l. in the south to 60 m a.s.l. in the north, and forms vertical cliffs along the coastline (Hazebroek & Morshidi 2005; Johansson 1999; Tan 1993).

On the Bako Plateau a small, deeply red coloured *Drosera* can be found in great abundance. This plant entered cultivation in Europe and the US in the early 1980s under the name "*Drosera* spec. 8 Borneo" (Weiner 1982). The morphological characters of this plant are stable throughout its range and are maintained in cultivation under artificial conditions. Thus the diminutive habit of the plant and the few-flowered inflorescence seem to represent genetically fixed characters, and are not environmentally induced growth modifications caused by the harsh conditions of its natural habitat. The plant's range is disjunct from known locations of "typical" *D. spatulata*, therefore we propose the rank of variety for this new taxon.

Latin Description and Specimens Examined

Drosera spatulata Labill. var. ***bakoensis*** A. Fleischm. & Chi. C. Lee *var. nova*.
Var. D. spatulata Labill. *sed inflorescentia breviore 1-3(5)-flora, folia parva 3-7(10) mm longa, stipulae c. 1 mm longae, pedunculi, pedicelli et sepala pauce glanduloso-puberuli.*

Typus: MALAYSIA, Borneo, Sarawak, Bako National Park: Telok Pandan path, c. 90 m [300'], coll. 4.5.1959, J. Carrick & I.C. Enoch JC/473 (SAR!).

Additional material examined:
Drosera spatulata var. *bakoensis*
MALAYSIA. Sarawak, Bako National Park: Pedang, 90 m (300'), coll. 22.4.1959, J. Carrick & I.C. Enoch JC/49 (SAR!); Teluk Assam, heath woodland, 120 m (400'), coll. 17.5.1955, J. T. Pursoglow, P.4926 and P.4927 (spirit material) (SAR!); Lintang path, sides of paths in open places free of litter, especially damp places, acid soil, coll. 4.6.1963 P.S. Ashton, S.17920, as *D. burmannii* Vahl (SAR!).

Description

Rosetted perennial, rosette diam. 1.5-2.0 cm. Leaf petiolate, 3-7(10) mm long, spatulate in outline, 3-nerved. Petiole cuneate, 1.5-4.0 mm long, ca. 0.2 mm wide at base to 1 mm wide at upper end; lower surface sparsely covered with white appressed hairs, upper surface glabrous. Lamina rotundate to spatulate, 1.5-3.0 mm long, 1.5-2.5 mm wide, upper surface covered with carnivorous glands, marginal glands enlarged (ca. 2 mm long), with elongate head; leaf lower surface sparsely covered with translucent short-stalked glands. Stipule papery, white translucent (drying brown), 3-laciniate, middle lobe broadly triangular, ca. 1 mm long and ca. 0.3 mm wide, apex bifid or irregularly dissected, lateral lobes narrowly triangular (to fimbriate), 1.5-1.7 mm long and ca. 0.1 mm wide at the base. Inflorescences 1-6, 1-sided racemes, scape 2-6(7) cm tall, 1-3(5)-flowered, peduncle filiform, terete, to 0.2 mm in diam., base slightly ascending, upper part of peduncle with sparse cover of short-stalked glandular hairs, lower part and peduncle base glabrous. Pedicel terete, 1.2-2.0 mm long, to 0.2 mm in diam., sparsely covered with short-stalked glandular hairs. Bracts subulate, 1.0-1.5 mm long, 0.1-0.2 mm wide, covered with few short-stalked glandular hairs; lowermost flower usually without bract, upper flowers subtended by a bract, topmost flower (or single flower on a 1-flowered scape) subtended by 2 bracts, usually with relics of an aborted terminal flower subtended by the above bract. Calyx subcampanulate, sparsely glandular. Sepals 5, elliptic to narrowly obovate with apex acute or, 2.5-3.0 mm long, 0.8-1.5 mm wide, glabrous or covered with very few short-stalked translucent glands, sepals slightly reflexed in fruit. Petals 5, elliptic to narrowly obovate, margins involute, apex subacute or slightly crenulate, 5-6 mm long, up to 3 mm wide, pale pink. Anthers 5, filaments curved, cuneate, pollen yellow. Styles 3, divided to the base, style segments entire or rarely bifid, translucent white to bright pink, stigmatic tips cylindrical, surface smooth or minutely papillate. Ovary 3-partite, subglobose, yellowish green. Seed black, ellipsoid to cylindrical, 0.4-0.5 mm long and 0.2-0.25 mm wide, testa reticulate (see Figure 1).

Distribution, Habitat, and Ecology

Drosera spatulata var. *bakoensis* is separated biogeographically from all known populations of *D. spatulata* var. *spatulata* by several hundred kilometres[1]. It is endemic to the Muara Tebas Peninsular in the Kuching area of southwest Sarawak, Borneo, and was so far only found within the area of the Bako National Park, on the Bako Sandstone Plateau. This sandstone plateau is markedly different from the surrounding habitats, and is a unique area in Borneo. The nearby Gunung Santubong is part of the same sandstone formation as Bako, but it is much steeper without a plateau, and thus does not provide suitable habitat for *Drosera*.

Drosera spatulata var. *bakoensis* is common on the Bako Plateau in the Bako National Park, where it grows in open heath areas in pure white quartz sand, sometimes mixed with clay, but is never found in organic soils (see Figure 2). This sundew is only found where it is consistently very wet, i.e., adjacent to small creeks or seepages on embankments. Unlike *D. burmannii* Vahl, it seems to be very intolerant of even occasionally dry soils. Some of the trees in the open heaths, where *D. spatulata* var. *bakoensis* grows, are *Ploiarium alternifolium* Melchior (Theaceae), *Cratoxylum glaucum* Korth. (Clusiaceae) and *Fagraea cuspidata* Blume (Loganiaceae), but the *Drosera* seldom grow directly underneath them. Associated carnivorous

[1]The only other population of *D. spatulata* reported from Borneo is that from Marai Parai, Gunung Kinabalu, Sabah, which is about 850 km distant from Bako National Park (Van Steenis 1953). Taking into consideration our perspective that the Kinabalu *Drosera* is most likely not *D. spatulata*, but represent a different species, the nearest populations of *D. spatulata* var. *spatulata* that we can confirm are in west Malaysia (i.e., Kedah Peak (Van Steenis 1954) and Cameron Highlands (pers. observations, CCL), about 1050 km distant from Bako National Park.)

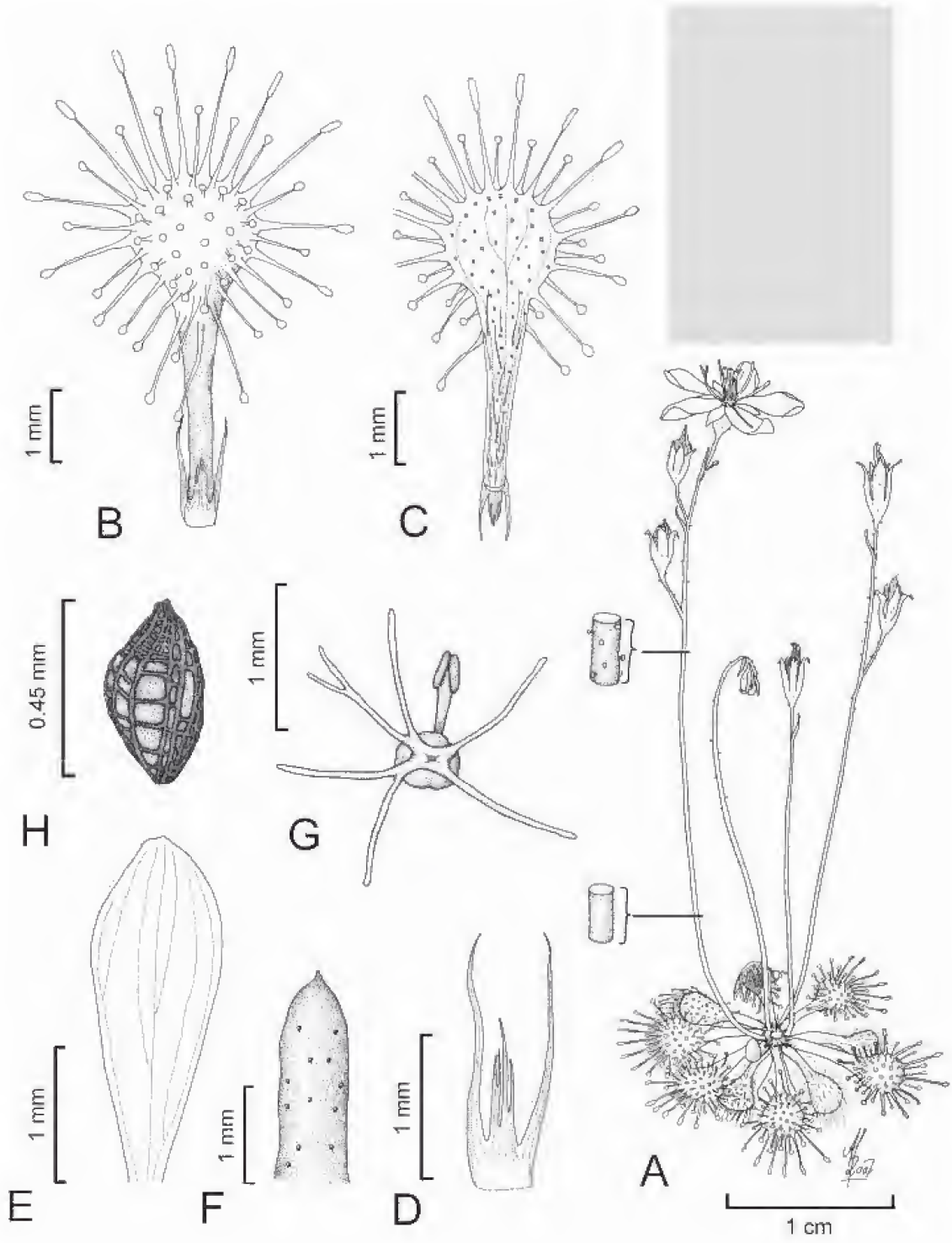

Figure 1: Line drawing of *Drosera spatulata* var. *bakoensis*. (A) Habit of plant in flower (with details of the peduncle surface near its base and middle), (B) leaf upper side, with attached stipule, (C) leaf lower surface, with the stipule bent back, (D) stipule, (E) detached petal, (F) sepal, (G) detail of the ovary, with one of the 5 anthers shown, and the three pairs of style arms—note the rare bifid tip of one of the style segments, (H) seed. Drawing by Andreas Fleischmann. Size of the scale bars indicated.

plants are *Nepenthes albomarginata* Lobb ex Lindl., *N. ampullaria* Jack, *N. gracilis* Korth., *N. rafflesiana* Jack, *Utricularia caerulea* L., *U. hirta* Klein ex Link, *U. minutissima* Vahl and *U. uliginosa* Vahl. *Drosera burmannii* Vahl has not been recorded from Bako, although it is common on nearby Gunung Matang and in Kuching (where *D. spatulata* is absent).

The annual rainfall at the park office area at Teluk Assam averages 4300 mm, with a seasonal peak during the monsoon season (landas) from November to February. Extended dry periods in the dry season from May to September contribute to the harshness of the plateau environment. The temperatures are equatorial, ranging between 20°C and 32°C (Good 1988).

Discussion

Drosera spatulata var. *bakoensis* (see Figures 3-5) differs from typical *D. spatulata* (as it is found in Australia, China and Japan for example; character values derived from our own observations are given in parentheses), in its distinctly petiolate leaves with broadly spatulate to rotundate lamina (cuneate to narrowly spatulate), the entire leaf being only 3-10 mm long (10-25 mm long). The stipules are ≈1 mm long, the two lateral lobes are about twice as long as the central lobe (5-7 mm long, lateral lobes equally long or up to three times as long as central lobe). Scapes are 1-3-flowered, but occasionally with up to five flowers in exceptionally large specimens, like J. Carrick & I.C. Enoch JC/49 (up to 20 flowers) and only sparsely glandular in the upper part, as are the pedicels and sepals (upper part of the scape, pedicels and sepals densely covered with short-stalked glands. (For a discussion of atypical plants from New Zealand that have glabrous sepals see the note below. A restricted population of *D. spatulata* in southeastern Queensland, Australia, with atypically short and hairy scapes has recently also been formally described as *D. spatulata* var. *gympiensis* (Gibson & Snyder 2005).) The petals are elliptic to narrowly obovate, 5-6 mm long, up to 3 mm wide and pale pink (obovate to oblong, 3.0-3.5 mm long, 2 mm wide, colour white or pink).

Figure 2: Typical habitat of *Drosera spatulata* var. *bakoensis* in Bako National Park. Photograph by Ch'ien Lee.

Some populations of *D. spatulata* found in New Zealand have a leaf shape similar to *D. spatulata* var. *bakoensis*. This is especially true for the "alpine form" (Salmon 2001), i.e., the plants described as *D. triflora* Colenso (Colenso 1890), which are similar to *D. spatulata* var. *bakoensis* in terms of size and number of flowers). However, the differences between the two sets of plants are as follows (New Zealand plants in parentheses): the base of the inflorescence scape is glabrous (lower 1/4 of the scape covered by simple white hairs), slightly glandular pedicels and upper third of the scape (pedicels and upper third of the scape glabrous), petals pale pink (petals white), and the stigmatic tips cylindrical and smooth to minutely papillate (clavate and papillate). The New Zealand populations of *D. spatulata* need further investigation and may deserve a distinct taxonomic classification.

Figure 3: Close-up of a rosette of *D. spatulata* var. *bakoensis*. Note the distinctly petiolate leaves. Photograph by Ch'ien Lee.

Figure 4: Group of *D. spatulata* var. *bakoensis* in Bako National Park, Sarawak, Borneo. Photograph by Ch'ien Lee.

Figure 5: Plants of *D. spatulata* var. *bakoensis* growing in shaded locations have a less vividly red coloration. Photograph by Ch'ien Lee.

In summary, this variety differs from typical *D. spatulata* in having a shorter scape with fewer flowers but larger petals, which are about twice as long as wide. The bases of the petals are not overlapping. Therefore, the sepals are clearly visible at anthesis when the flower is viewed from above (Figure 4).

Acknowledgements

The authors appreciate the kind assistance of Stewart McPherson, Dorset, England, Christian Klein, Merzig, Germany, and Anja and Holger Hennern, Bochum, Germany, for giving inspiring comments to the habitat description and supporting photographs of plants in the wild in Bako National Park, Borneo. Special thanks are also due to Thomas Carow for tracing back Harald Weiner's old sales lists, and to L.C.J. Julaihi of the Sarawak Herbarium for providing access to the specimens, as well as to a reviewer for helpful comments on the manuscript. No permits were required to conduct the work for this study.

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News and Views

Stephen Davis (stephen@carnivorousplants.org) writes: The California Academy of Sciences has reopened with much fanfare and has several exhibits featuring carnivorous plants. Geoff Wong and Stephen Davis designed and built a 3' × 3' × 4' exhibit exclusively populated with CP. It features sphagnum moss walls with blooming *Pinguicula* from California Carnivores sown into them, and has nearly all genera of carnivorous plants represented. This display is temporary and is located downstairs among the tropical fish in the Steinhart Aquarium.

Judith Finn, Geoff, and Stephen put together two towering moss walls in the rainforest exhibit and covered them with *Nepenthes* and orchids. *Sarracenia*, when they aren't dormant, grace the edge of the albino alligator exhibit, and a small frog terrarium contains several species of carnivorous plants. There are also a few carnivorous plants on the moss wall in the cafeteria. Kristen Natoli is the first horticulturalist the Academy has had and has been a big advocate of the carnivorous plants and the displays. The California Academy of Sciences is located in Golden Gate Park in San Francisco.

Brocchinia reducta LIGHT PREFERENCES

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Keywords: cultivation: *Brocchinia reducta*, lighting.

Brocchinia reducta is one of those species of plants that has, at best, mixed support by carnivorous plant growers. The plant's problem is that it is usually relegated to the ranks of semi-carnivory, or even noncarnivory. This is because it apparently does not produce its own digestive enzymes, nor does it seem particularly specialized for capturing insects. In fact, most photographs of the plant in cultivation show that it looks like a fairly unimpressive, urn-shaped bromeliad (see Figures 1, 2).

I have grown this plant for nearly a decade, and agree that in most settings it is indeed a rather boring bromeliad. I do not even maintain plants in my own collection, instead I grow the plants at the University of California (Davis) collections. It is trivial to grow—it does not seem to care too much about the soil medium, and keeping it in a 1:1:1 sand:perlite:peat mix or 3:1 perlite:sphagnum mix and temperatures anywhere in the range 15-35°C (60-95°F) works just fine. I provide the plants with purified water, which I pour directly into the pitcher urn. I do not fertilize them.

Typically a plant matures within a few years, produces an inflorescence, and then dies. As it rots away, two or more new shoots emerge from the plant—these are called pups by bromeliad growers—and they can be separated when the parent plant rots away. Usually the pups are produced on the sides of the parent plant, but very occasionally they emerge from the center of the urn. Equally rarely, a tiny pup may emerge from the soil, spaced a few cm away from the plant by a slender stolon and looking very much like a seedling. All my plants are genetically identical, as they are vegetatively produced descendents of a single parent plant. As such, I have not had success self pollinating them.

I have never seen or photographed this plant in the wild, so when I wrote my book I relied upon Stew McPherson for a few images. Looking at the images he sent to me, I was struck by how plants in the wild looked so different from images of plants in cultivation. Wild plants are tall, narrowly tubular, yellow-green, and very strange looking. They did not look at all like the conventional dark-green, urn-shaped bromeliad I had become accustomed to by looking at plants in my own cultivation, or for that matter the unremarkable plants in anyone else's cultivation!

I wondered—is it possible that the clones in cultivation were some boring strain that did not look as interesting as the plants in the wild? Or was it possible that they would assume the vastly more interesting form, as expressed by wild plants, if they were grown better? I guessed that the most likely error was in illumination—after all, these are plants that grow in extremely high light levels on the tops of tepuis and in the Gran Sabana. Recently, at the University of California (Davis), a new greenhouse was built for our Botanical Conservatory. The new facility is warm and extremely bright, and we are still learning what plants grow best there. We have found that *Dionaea* and *Drosophyllum* love it there, but that it is far too bright for *Nepenthes*. I wondered how our boring *Brocchinia* might survive there. One of our plants had just flowered, and was producing three pups—two laterally and one from the urn center. I put the pot in the bright greenhouse and watched the pups develop over the next year.

I was amazed at the results. While the plants in our main greenhouse still look like boring bromeliads, the plants in our bright greenhouse look more like wild plants! They are yellow-green, and extremely tall and narrow (see Figure 3). In fact, they are very interesting looking plants. I suspect that if everyone grew them under extremely bright, full sun conditions, they might have much more natural looking plants, and this bromeliad might get a little more respect and enthusiasm from the carnivorous plant community.

Figure 1: *Brocchinia reducta* grown under fairly low light levels. The foliage is bright green and spreading. Even though unnatural in appearance, the plant is producing an inflorescence.

Figure 2: *Brocchinia reducta* grown under higher, but still inadequate light levels. The foliage is somewhat more tightly cylindrical and yellow.

Figure 3: *Brocchinia reducta* grown under high light levels. The pot contains the decaying, dead, parent plant and its old inflorescence, two lateral plantlets, and a developing central plantlet.

New Cultivars

Keywords: cultivar: *Byblis* 'Goliath', *Nepenthes maxima* 'Lake Poso', *Sarracenia* 'Reptilian Rose', *Sarracenia* 'Black Widow', *Sarracenia* 'Royal Ruby', *Sarracenia* 'Alucard'.

Sarracenia 'Reptilian Rose'

Submitted: 2 December 2008

Sarracenia 'Reptilian Rose' (see Figures 1 and Back Cover) is a complex hybrid of a clone informally called *S. oreophila* "Sand Mountain", with *S.* 'Royal Ruby' (see Figure 4). This hybrid was produced by Phil Faulisi. The specific cross was made in May of 2000 with the seed from this cross being sown in January of 2001. This select plant was chosen and named in May 2004. Pitchers of this plant typically grow 71-86 cm (28-34 inches) in height with a large flaring hood. The early spring pitchers of this plant tend to be more robust, attaining greater size and colouration than pitchers put out later in the season. The pitchers of this plant have inherited the heavy venation from their Sand Mountain *S. oreophila* parent displaying the trait as the pitchers develop and first open. As the pitcher ages it develops an overall beautiful pinkish-rose colouration. Another characteristic of this plant is that the nectar roll often puckers up in places, creating an almost fanged appearance. This plant commonly produces phyllodia in the fall that are moderately curved in the manner of *S. oreophila*. The blooms on this plant open a vibrant yellow with a few red markings at their base. Over the course of about a week the petals develop an apricot-orange hue. One thing that we (THW and PF) have both noticed is that the blooms on this plant will occasionally be malformed such that their parts are produced in threes and fours, instead of the usual five. This malformation does not appear to affect the fertility of the specific bloom as both of us have produced seed from such malformed blooms. The unique nature of this plant necessitates that it only be reproduced through vegetative means.

The name for this plant derives from a combination of factors. A fellow carnivorous plant grower and colleague of Phil's, Mitchell Davis, was examining the plant one day and happened to mention that the veining pattern in the throat and inner hood resembled the skin definition of a lizard, hence "Reptilian". Previously, Phil had discovered that the pitcher hoods were highly fragrant in a manner reminiscent of English roses. In addition, the mature colouration of the pitchers is a deep rose.

—Travis H. Wyman • 4063 Indian Lakes Circle • Stone Mountain, GA 30083 • USA • asplundii@gmail.com

Sarracenia 'Black Widow'

Submitted: 2 December 2008

Sarracenia 'Black Widow' (see Figure 2 and 3) is a simple hybrid of a *S. alata* clone informally called "black", with *S. flava* var. *rubricorpora*. It was produced by Phil Faulisi in May of 2000 and the subsequent seed was sown January 2001. The selected plant was chosen and named in May 2004. The clone of *S. flava* var. *rubricorpora* used as a pollen donor in this cross (and seed parent in the following cross) was the product of line breeding done by Phil with the intention of producing an extremely dark, all red clone of *S. flava* var. *rubricorpora*. Pitchers of this plant average 76-86 cm (30-34 inches) in height. Developing pitchers start out with a base colour of green with very heavy reddish-black veining.

Eventually the red-black colour fills in, turning nearly the entire pitcher a deep, shimmering, maroon. As the season progresses the pitcher colours continue to deepen becoming a deep lustrous purple-black especially around the throat and inner hood, an influence from the *S. alata* parent. The flowers of this plant are a very pale white-cream. This plant should only be reproduced through vegetative means.

The name for this plant was chosen because of a fortuitous encounter with a large black widow spider that was found living amongst the pitchers, the colour of the spider's body was similar to the deep glossy black-purple colour displayed by the fall pitchers.

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Sarracenia 'Royal Ruby'

Submitted: 2 December 2008

Sarracenia 'Royal Ruby' (see Figure 4) is a natural *S.* ×*moorei* hybrid collected from northern Florida in 1991. Phil Faulisi obtained the plant in 1992. Even before the pitchers are fully developed and open they display a distinct pink flush that deepens as the pitcher matures. Overall the lower portion of the pitchers is coloured a deep olive-green while the upper portions are suffused in lush pink/red raspberry tones. The quality of this colour is best described as luminous or iridescent, and often makes clusters of pitchers appear to glow. Under intense light this raspberry colour can suffuse the upper three-fourths of the pitcher but more commonly it dominates the upper half to upper third of the pitcher. This plant shows a high degree of the *S. leucophylla* influence in the shape of the hood displaying significant ruffling. Likewise, fenestrations on the hood and upper regions of the pitcher expose the *S. leucophylla* influence in the cross. The pitchers of *S.* 'Royal Ruby' typically grow 76-86 cm (30-34 inches) in height, but pitchers over 107 cm (42 inches) in height have been observed (PF). The flowers are bi-coloured, the petals being predominantly red with orange/yellow tips. This plant must be reproduced only through vegetative means to ensure that its unique nature is maintained.

The name 'Royal Ruby' was chosen by Phil in May 2004 because of the regal beauty of the plant and how the colour is similar to that of Burmese rubies. *S.* 'Royal Ruby' was previously distributed by Phil as *S.* ×*moorei* "Big Red".

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Sarracenia 'Alucard'

Submitted: 2 December 2008

Sarracenia 'Alucard' (see Figure 5) is a complex hybrid of *S. flava* var. *rubricorpora* × *S.* 'Royal Ruby', and was produced by Phil Faulisi. This cross was made in May of 2000 and the subsequent seed sown January 2001. Numerous offspring of this cross display the same character and traits described herein. In structure the pitchers are similar to those of *S. flava* though the hoods tend to display a slight degree of ruffling alluding to the presence of *S. leucophylla* genes in the mix. Pitchers average 76 cm (30 inches) in height but can grow to 94 cm (37 inches) tall. Under extremely high light and, most notably, under very bright greenhouse polycarbonate, the pitchers will turn a near complete deep reddish-black

over their entirety. The hoods of some pitchers will occasionally show slight green patches, but this is not consistent within or between plants with some plants displaying many green-patched hoods one season and, few the next, while others will produce pitchers with the same lid type season after season and then suddenly revert to the opposite type. As the pitchers age, most turn a complete velvety black, very similar to the colour of cultivated "black" calla lilies. The flowers are yellow. Vegetative reproduction of these plants is recommended and preferred, however any offspring resulting from the crossing of a heavily red *S. flava* var. *rubricorpora* pollinated by *S.* 'Royal Ruby' that display the same black pitchers would also be considered to be *S.* 'Alucard'.

The name Alucard is Dracula spelled backwards and was chosen because the appearance of this plant gives the impression of a dark ominous presence hovering over other accompanying pitcher plants when grown communally in bogs/grouped pots. The name was selected May 2004.

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Figure 1: *Sarracenia* 'Reptilian Rose' young pitchers. Photo by Phil Faulisi.

Figure 2: *Sarracenia* 'Black Widow' early pitchers. Photo by Phil Faulisi.

Figure 3: *Sarracenia* 'Black Widow' late pitchers. Photo by Robert Co.

Figure 4: *Sarracenia* 'Royal Ruby'. Photo by Trent and Michelle Meeks.

Figure 5: *Sarracenia* 'Alucard'. Photo by Travis Wyman.

Submitted: 13 June 2008

In 2007, I received five seeds of "*Byblis filifolia*" from Australian sources. I did so much trading that year that, I must admit I do not remember the exact source of these seeds. The seeds were sown on fine milled sphagnum, treated with a small grass fire, and then the pot was left well-lit and moist.

I was surprised when germination occurred within five days! The seedlings were extremely vigorous and greatly resembled *Byblis liniflora* until they were about 8 cm (3 inches) tall. The growth rate dramatically increased at that point. The stem elongated and internode distance increased rapidly (see Figure 6). During the next three months, they grew up to 4 cm (1.5 inches) a week. In time, specimens grow up to 1 meter (3 feet) tall! Plants can reach maturity in five months and produce flowers in showy masses (see Figure 7 and Front Cover). The flowers open at first light and promptly close by 4 p.m.

To produce seed, the flowers must be cross-pollinated. Flowers will not self-pollinate, nor will pollen from different flowers on the same plant be successful. The flowers will last for about a week if not pollinated. Upon successful pollination, a flower takes on a slight bluish tint and then the petals drop off after three days. The petals are fused, even after petal drop.

What happens next truly makes this *Byblis* variant unique.

On the third day, the base of the pedicel changes character. It swells, elongates, and reflexes downward. It also becomes somewhat pale and transparent. The once-erect flower stalk is forced towards the ground as its ripening seed capsule develops (see Figure 8).

The pedicel swelling is similar to structures on the base of legume stems, which are called pulvini (singular: pulvinus). Turgor pressure changes in the pulvinus of the "sensitive plant" (*Mimosa pudica*) is what causes that plant's leaves to droop when disturbed.

The entire process of changing direction from upright to furthest downward takes five to six days. I have determined that the pedicel appendages are geotropic. This was achieved by bending the top half of the plant over to an upside-down position immediately following pollination of several flowers. The pedicel appendages still formed and pointed down to the ground, regardless of its position. Seed capsules are slow to ripen and dehisce in four to five weeks.

I made another interesting discovery about these *Byblis* plants in late October, 2008. The plants have a smell which reminds me of a sweaty, musty shirt that has been worn a few times without being washed. The smell is strongest near the center and the bottom of the plant, and the growth tip and flowers are completely odorless. What is more, the plants exhibit almost none of this smell until they are disturbed—a shaken plant changes from being only slightly smelly to quite pungent in only a few minutes! I think this smell may function to either repel herbivores or attract prey.

Another amazing thing about this variant is that it roots easily from cuttings, with an 80 to 90% success rate. The cuttings root in two to three weeks and exhibit the same traits as the parents. Live sphagnum works best as a rooting medium. When well rooted, the plants prefer to be moved into a half sand/half peat mix. They like a medium that is wet, but not oversaturated. I use tall pots at least 13 cm (five inches) wide per plant, to accommodate the many long fibrous roots.

The main stem on the parent will branch many times. Mass amounts of shimmering plants can be produced in no time. If the plant is cut back more than half way, several growth points will appear along the older axils of previous leaves. After their massive flowering cycle is over, the plant becomes exhausted, and it declines and ultimately dies. Although I have kept these annuals alive past this point, they are usually so tall, weak and unattractive that I usually let them go to carnivorous plant heaven! By this time, they have usually each given me many plants via cuttings and lots of seed as well.

Figure 6: Young *Byblis* 'Goliath' plants.

Figure 7: Flowering *Byblis* 'Goliath,' exhibiting ascending inflorescences.

Figure 8: The bizarre, pale reflexing organs that bend the fruit towards the ground.

Of course, I have wondered what species this is. It shows the long internode growth habit of *Byblis filifolia*, but combines the reflexed pedicel of *Byblis aquatica*. After a few conversations with Jan Schlauer, who I graciously thank for his assistance, I theorize that there is a possibility of this plant being a naturally occurring hybrid between the two species. I have spoken with several other growers of *Byblis filifolia*, but they did not notice any reflexure of the flower pedicels on their *Byblis filifolia* plants following successful pollination. The flower pedicels on their plants remained straight up, as with *Byblis liniflora*. I plan on researching this in much greater depth, of course, and keeping everyone updated on my success.

In order to give this plant a name that can be easily used by other horticulturists and scientists, on 9 June 2008 I coined the cultivar name *Byblis* 'Goliath' for the plant. This name is appropriate for two reasons. In the Bible story, Goliath was a massive giant who was challenged and defeated by a sling-wielding David. Growing up to three feet tall, this cultivar is a giant indeed! Furthermore, the downward reflexing pedicels with its seed capsules remind me of David dangling his stone-laden sling to kill the giant Goliath. It is evident that this *Byblis* 'Goliath' truly stands above all the rest!

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Nepenthes maxima 'Lake Poso'

Submitted: 29 August 2008

Nepenthes maxima Reinw. is currently defined as a species native to the islands of Sulawesi, New Guinea, and the Maluku Islands. In the past, some folks have also combined plants from Borneo into their concept of *N. maxima*; but most people now consider these to be separate species: *N. fusca* Danser, *N. hurrelliana* M.Cheek & A.L.Lamb and, more distantly, *N. stenophylla* Mast. and *N. chaniana* C.Clarke, C.C.Lee & S.McPherson, and *N. fallax* Beck. However, I remain unconvinced *N. eymae* Shigeo Kurata is a species separate from *N. maxima*.

This article focuses on a miniature variation of *N. maxima*, endemic to the lowland areas near Danau Poso (Lake Poso) in Central Sulawesi, Indonesia. Danau Poso is in a lowland area, surrounded by hills and mountains. Many visitors have reported seeing miniature *N. maxima* in the lowland areas directly adjacent the lake. Over the years, some of these miniature plants were collected and brought into cultivation during the late 1970s through early '80s (Rich Sivertsen, Phill Mann, personal comm., 2007). They maintained their small stature consistently, despite being cultivated side-by-side in the same manner as other clones of *N. maxima* for several years, in some collections, for more than a decade (Rich Sivertsen, personal comm., 1999, 2008). In this article, I establish the cultivated variety name *N. maxima* 'Lake Poso' to discuss these miniature plants.

The main difference between *Nepenthes maxima* 'Lake Poso' and the more typical expression of *N. maxima* is the stature of the entire plant. *Nepenthes* 'Lake Poso' is generally about 1/4 to 1/2 the size of most of the other *N. maxima* varieties. As per Danser (1928), the type variety has climbing stems with leaves, "usually 15 to 30 cm long by 2.5 to 7 cm broad". However, in *N.* 'Lake Poso' the diameter of the rosette (without tendrils and pitchers) of the cultivated plants has varied from only 20 to about 32 cm. The leaves of *N.* 'Lake Poso' are usually 8 to 16 cm long by 1.5 to 3 cm broad making the leaf surface area about 1/4 the size of leaves on normal or average sized *N. maxima* plants. The pitchers are correspondingly much smaller as well and most often the peristomes of the pitchers do not seem quite as wide as one might expect from *N. maxima*, although the peristomes of the upper pitcher can be well developed. In cultivation, the stems can reach lengths of a few meters, but the diameter is reduced, giving the plants a more gracile or slender and somewhat wiry appearance as compared to most other forms and varieties

Figure 9: *Nepenthes maxima* 'Lake Poso'. Clockwise from top-left: Upper pitcher from 400 m, upper 700 m, intermediate pitcher 700 m, lower pitcher from 700 m. Photograph by Alfindra Primaldhi.

of *N. maxima*. This variety shows more tolerance for warm weather as compared to several other widely cultivated varieties or expressions of *N. maxima*.

In January 2008, Alfindra Primaldhi and Muhammad Apriza Suska went on an expedition to explore Danau Poso and surrounding areas with the intention of studying the native carnivorous plants. They visited two locations where *Nepenthes maxima* 'Lake Poso' occurs and Alfindra kindly provided us with photographs and more information about the wild plants (see Figures 9 and 10): These small plants have thinner and somewhat shorter stems. The height of flowering plants only reach about 2/3 the height as compared to normal *Nepenthes maxima*. The only *N. maxima* plants that grow near Lake Poso (485 m a.s.l.) are *Nepenthes maxima* 'Lake Poso'; this diminutive variety grows in the hillsides to an elevation estimated to be about 1200 m. The nearest normal sized *N. maxima* are found further away, 10-15 kilometers north and south from Lake Poso in highland areas above 1,600 meters. The closest normal sized *N. maxima* were found over 1 kilometer past the last of the small plants.

We have two theories regarding the origin of this variety: 1) Natural variation within *Nepenthes maxima* caused by local environmental pressures we do not understand. Some animal populations respond to being trapped on small islands by becoming smaller in stature (pygmy deer and alligators of Deer Key, Florida, USA). Perhaps the small lowland areas adjacent Danau Poso induced a similar evolutionary reaction in locally abundant *N. maxima*. 2) The Danau Poso area populations of *N. maxima* absorbed another species of small stature, possibly *N. gracilis* Korth. during ancient times. While discussing this, Alfindra mentioned that the closest known location for *N. gracilis* is over 100 kilometers to the south and Danau Poso is surrounded by mountains and other highland areas, making it very unlikely *N. gracilis* could migrate into the area. While this is true now, I suspect the climate may have been significantly warmer in the past, possibly warm enough for *N. gracilis* to have colonized the Danau Poso area.

Alfindra and M. A. Suska also found a third miniature population at 1,600 meters where *N. maxima* grows along with *N. glabrata* Turnbull & Middleton and *Drosera burmannii* Vahl (Primaldhi 2008). It is not clear if these dwarf, highland *N. maxima* plants should be included into the concept of *N.* 'Lake Poso'. Alfindra states, "From my personal opinion, it reminds me of the miniature *N. maxima* found around Anggi Lakes in Papua. Please review the photographs and notes from that area by Dr. Andreas Wistuba." Alfindra distributed seed of this variety labeling it, "mini-maxima 1,900 meters" (the 1,900 meters was a transcription typo and was actually 1,600 meters altitude). If these plants also show warm weather tolerance in cultivation, they can be included in *N.* 'Lake Poso', unless they demonstrate some other morphology, like the adult plants no longer being significantly smaller, gracile and wiry in appearance. The larger, wavy leaved form of *N. maxima* can also be found in the highlands around the lake; on this expedition it was found at a location measured at 1,900 meters altitude, a little over one kilometer past the last of the small plants.

In April, Alfindra, Muhammad and friends visited another location (which is scheduled to be cleared for development), this time in New Guinea where a miniature *Nepenthes maxima* was found growing with *N. klossii* Ridl. at 1,700 meters altitude. Several plants with intermediate morphology were found and these are most likely hybrids between the two species. Alfindra says these "mini-maxima" appear more similar to the plants found at 1,600 near Lake Poso as well as the plants Dr. Wistuba found near the Anggi Lakes, New Guinea (Primaldhi, A. and Suska, M.A. personal comm., 2008).

Based on reports by Alfindra and several other *Nepenthes* explorers, it would seem there are at least several locations where miniature expressions of *N. maxima* occur and these plants may represent an unrecognized intra-specific taxon. However, it is far beyond the scope of this article to propose any changes in the taxonomy of *Nepenthes maxima* Reinw. In the case such a change is made, *Nepenthes* 'Lake Poso' might be considered as a selection from this form or variety; although at this point the relationship between *Nepenthes* 'Lake Poso' and other dwarf or miniature expressions of *N. maxima* is unknown.

There are several mature clones of this cultivated variety already in some collections and seed was recently dispersed to several experienced growers. At this point, cuttings are an easy and reliable method to propagate this variety. If female and male clones of *N.* 'Lake Poso' flower concurrently, seed can be produced and labeled as such. Also, more clones can be collected from the lowlands directly adjacent to Lake Poso of Central Sulawesi; provided these match the description of significantly reduced stature and somewhat gracile, wiry appearance. Coloration is not important and will vary from clone to clone, the general shape of the leaves and pitchers can also show considerable variation as is normal for *N. maxima*. It is entirely possible an all-green or all-red clone could be found in a batch of seedlings or even in the wild. Plants matching the general physical description, but not from near Danau Poso should not be considered *N.* 'Lake Poso'.

Alfindra collected and distributed seed from two lowland populations of small plants. The first location was at 400 meters and the second at 700 meters altitude; the third, questionable population, at 1,600 meters. The composite photos in the standard are from wild plants of both lowland populations (see Figure 9). Based on Alfindra's photographs and his description of the plants, we are confident seed collected from these two lowland populations will grow into plants of *Nepenthes* 'Lake Poso'.

Notice: We prefer only seed be collected from wild plants. Many *Nepenthes* species are facing tough times, with massive habitat loss mostly caused by human activities like logging and farming. Oil Palm plantations are now a particular concern for many threatened species of plants and animals. When visiting wild locations, please take precautions not to damage the plants or their habitats, and follow all national and international laws as applied to field collection.

For cultivation, use a well draining *Nepenthes* media or soil. This variety is more of an intermediate grower rather than a true lowland plant and can handle a fairly wide temperature range. It does best with warm to hot days and cool nights, but avoid longer periods of cold nighttime temperatures which ultra-highland plants may favor. This is unlike the more heat sensitive

Figure 10: Upper Pitcher from 400 m location, hand included for scale. The pale/cream coloration of this pitcher is very common for upper pitchers of *Nepenthes maxima* 'Lake Poso.' Photograph by Alfindra Primaldhi.

plants from the highlands like the wavy-leaf form which I have found require cool to warm, but not hot, days in combination with cool to cold nights to remain vigorous. Selective breeding can probably produce plants that are even smaller. Good luck.

This article would not have been possible without the help of Alfindra Primaldhi, M. A. Suska, Rich Sivertsen, Phill Mann, Henning Von Schmeling, and Thomas K. Hayes. No permits were required for the expeditions visiting the areas around Danau Poso, the *Nepenthes klossii* location in New Guinea and the collections of seed.

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Pinguicula planifolia submersion technique

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Keywords: cultivation: Pinguicula planifolia, submersion.

Due to the many emails I've received for more information on my *Pinguicula planifolia* submersion technique, I figured here's a wonderful place to share it!

First, NEVER do this technique in the summer or in very hot weather exceeding 35°C (95°F), you might lose your plants to rot. Cool, fall weather is the best time to begin and experiment with your growing conditions. I prefer to grow my *Pinguicula planifolia* in a mix of 3/4 sand to 1/4 peat, as it mimics the conditions in the wild, and I've seen them many times in this type of soil. Slowly fill the container to submerge them completely and leave only the tips of the crown leaves above water. Try not to pour quickly, as this will cover the leaves in peat/sediment. Round Tupperware containers with no drainage of course work best.

Believe it or not, you want STRONG sun while submerged; that's why cooler temps are crucial. Let the container sit submerged for three weeks. During this time I experience a "growth explosion" with my *Pinguicula planifolia*. I theorize that the plant produces larger leaves to make up for lack of UV sunlight during submersion. During the fourth week, slowly allow the soil to become very wet to the touch and then only moist. Now, here's where you'll "color" your plant by exposing the new jumbo leaves to strong sun to achieve that lovely red hue!

Keep your plants in this moist-only condition for one month, then submerge again. Remember to discontinue treatment when constantly hot weather returns.

Currently, I'm using this technique for *Pinguicula lutea* and *Pinguicula caerulea* as well. So far, they've been completely submerged for five weeks without any apparent harm and are beginning to flower. I'll keep everyone posted on my success with these two species.

This method will allow you to grow huge "cabbage-head-sized" *Pinguicula planifolia*, and you'll be amazed at how it affects flowering, with numerous spikes in spring!

Using this technique, I have successfully maintained in cultivation the same adult plants for over three years. Many have divided and now have multiple crowns, a phenomenon rarely seen with this species. I'll be constantly updating everyone on my success and donating some seed from my "giants" to the ICPS seed bank in spring. Best of luck, and enjoy these gorgeous red gems!

Looking for horticultural effects of SUPERthrive™ on *Nepenthes*

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Keywords: cultivation: *Nepenthes*, SUPERthrive™ .

Introducing SUPERthrive™

SUPERthrive™ is a mysterious, smelly brown liquid that some carnivorous plant growers say has marvelous horticultural properties. Those who love it feel it does wonders for their plants, while those who laugh at it point at the frenetic but oddly empty claims printed on each bottle (e.g., "Dozens of the world's science miracles in every drop!" "50 Instant BioUsables," "The billions-proven extra life maker for plants.")

Does SUPERthrive™ work? No carnivorous plant grower has ever published a study documenting its value. All too often, reports are anecdotal stories based upon only a few plants (such as, "It saved my *Nepenthes rafflesiana* from death!") or in tests for which there was no control group (i.e., there were no comparison plants with no SUPERthrive™ applied). In this paper we present our investigations into the effects of SUPERthrive™ (hereafter, ST) upon *Nepenthes*.

If ST has such amazing effects, they should be easily observed in simple experiments.

Experiment I: Drenched Cuttings

ST supposedly can improve the success rates of rooting *Nepenthes* from cuttings. When we root *Nepenthes* cuttings, our usual method involves cutting a long stem into one-node or two-node segments. The leaf blades are trimmed to 1/3-1/2 their full length, and the cuttings are planted in moist *Sphagnum*. These cuttings are kept in baggies or terraria in moderate light and in warm conditions. Successful cuttings develop roots within a few months. We incorporated ST into our method to see if it would improve our success rates.

We selected two large plants for this experiment: *N.* ×*superba* and *N. alata*. The success rate of cuttings from these plants depends upon the quality of the cutting. For example, green stem cuttings usually root successfully, while old woody stem cuttings usually fail. We took sixty cuttings from these plants, and randomly divided them into two groups of thirty cuttings each. Both groups included comparable numbers of green and woody cuttings.

The ST concentrations that growers use for this treatment vary, but one "capful" of ST per liter of purified water is commonly cited. The volume of a "capful" probably depends upon the size of the bottle purchased; our resultant ST concentration was 1.9 ml l^{-1}. After being prepared and potted, the thirty plants in the test group were drenched with the ST solution (i.e., sprayed until all plant surfaces were fully wetted). The liberally applied ST drained from the leaves into the soil mix. The cuttings in the control group were also drenched, but with purified water only.

After 12 weeks, we dug the cuttings out of the rooting medium and examined their root systems (see Table 1). In order to avoid observational bias, the person examining the root systems was not told if the plant had been treated with ST. The overall sizes of the root systems of cuttings were ranked as small, medium and large (S, M, L, respectively). A small (S) root system typically consisted of roots only 5-20 mm long; a medium (M) root system consisted of roots 20-40 mm long, and large (L) roots systems had roots 40-90 mm long. Dead cuttings were recorded as "D". The length of each successful cutting's longest root was also measured.

Plant/Group	% Rooted	Root System Rank[1]	Longest Root[2] (cm)
ST group			
N. ×*superba*	83%	4D,4S,6M,9L	3.5±1.4
N. alata	86%	1D,1S,1M,4L	3.8±1.0
All ST plants	83%	5D,5S,7M,13L	3.6±1.3
Control plants			
N. ×*superba*	96%	1D,3S,12M,7L	5.4±2.1
N. alata	100%	0D,1S,4M,2L	4.7±1.9
All control plants	97%	1D,4S,16M,9L	5.2±2.0

[1]Root system rank indicates overall size (Dead, Small, Medium, Large). See text for details.

[2]Mean ± 1 SD is shown.

Table 1: Results for experiment I (soil drenches on fresh cuttings).

Experiment II: Soaked Cuttings

Some growers submerge their fresh cuttings in a dilute ST solution for an hour before potting them. Soaking fresh cuttings is wise because it may decrease damage from cavitation (an effect where air is drawn into a freshly cut stem, thus decreasing the ability of the stem to transmit fluids). In our experiment to study the affects of ST on this propagation method, four plants were used as cutting donors (Table 2). From previous experience, we knew that the difficulty of producing successful cuttings from these plants ranged from easy (*N. ventricosa*), to medium (*N. thorelii*), to difficult (*N. tobaica* and *N. carunculata*). Ninety-seven cuttings were prepared for this trial. Half the specimens were soaked in a dilute ST solution (1.0 ml l^{-1}) for 46-60 minutes while the other half were soaked in purified water. Afterwards, the cuttings were planted in moist Tasmanian *Sphagnum* and treated as normal cuttings. Thirteen weeks later, the cuttings were carefully exhumed and examined. The presence or absence of roots was recorded.

Plant/Group	# of cuttings	% Rooted
ST group		
N. ventricosa	28	46%
N. tobaica	10	40%
N. thorelii	6	100%
N. carunculata	4	0%
All ST plants	48	48%
Control plants		
N. ventricosa	30	50%
N. tobaica	11	27%
N. thorelii	5	100%
N. carunculata	3	0%
All control plants	49	47%

Table 2: Results for experiment II (soak treatment).

Experiment III: Long Term Exposure

Some growers claim the best way to use ST on *Nepenthes* is through a weekly or biweekly spray. We tested this claim using twenty-seven plants: 9 *N.* ×*superba*, 12 *N. alata*, 3 *N. ventricosa*, 1 *N. maxima*, and 2 *N. gracilis*. These plants ranged from just-rooted cuttings to young plants a few decimeters tall, and none had had prior exposure to ST. The following measurements were taken for each plant: stem length, number of leaves, number of pitchers, and the total leaf surface area. (The leaf surface area of each plant was approximated as $C\sum w_i l_i$, where w_i and l_i are the leaf width and the leaf length of the *i*th leaf; since the leaves of all the plants studied were approximately diamond-shaped, the sum was multiplied by the geometrical factor C=0.5. Note that the percent leaf increase is insensitive to the geometrical factor used.) The plants were divided into a test group and a control group with similar size and taxonomic compositions. The two groups were grown side by side in a heated greenhouse, and once per week the test group was sprayed-to-wet with a solution of two drops ST per gallon purified water (0.02 ml l^{-1}), a frequently advised concentration. Some ST drained into the soil of the test plants, as prescribed by ST advocates. The control group was similarly drenched, but with pure water only.

Once per month the placement of the two groups in the greenhouse was switched so any environmental differences would be minimized over the duration of the experiment. After six months, the two groups were inspected, and the plant dimensions listed above were once again recorded (see Table 3).

Analysis

Experiment I: We observed nothing of significance when ST was used in a one-time leaf and soil drench on new cuttings (Table 1). The overall rooting success rate of fresh cuttings was actually lower when ST was used (83% vs. 97%), but given the relatively small numbers of plants in the experiment the difference was not large enough to be significant. (Welch's t-test yielded p=0.09.) We observed no differences in overall root system rank, nor were we able to detect differences statistically. The root fibers for the ST plants were shorter (3.6±1.3 cm) than those of the control plants (5.2±2.0 cm), and this result was statistically significant (p=0. 0009). However, we both noticed that while the root fibers of the ST plants were shorter, the root systems seemed commensurately more bushy so the root systems in both groups were of comparable overall size. No differences between the two groups were observed in the number or size of leaves produced. In summary, there were no important differences from ST, either beneficial or detrimental, although ST may have caused minor root length dwarfing.

Experiment II: The data in Table 2 provide absolutely no evidence that soaking fresh *Nepenthes* cuttings in ST has any effect, either beneficial or detrimental. A t-test analysis produced p=0.92, supporting this lack of measurable effects.

Experiment III: We examined the data from this experiment for any trends that could be attributed to long-term exposure to ST. The average stem length growth was 16.3 cm for ST

Stem length change (cm)	# of pitchers change	# of leaves change	Leaf area change (cm^2)	Leaf area change (%)
ST group				
16.3±17.9 (1-45)	2.6±1.3 (0-4)	5.9±2.6 (1-9)	189±202 (1-500)	356±398 (2-1500)
Control group				
19.2±24.3 (-1-77)	2.0±1.5 (0-5)	6.8±3.5 (2-14)	192±243 (-17-737)	517±691 (-33-2200)

Table 3: Results for experiment III (long term exposure).

plants (19.2 cm for control plants), and the total new leaf production was 5.9 new leaves for ST plants (6.8 new leaves for control plants). Despite many attempts at binning or categorizing the data, we found no significant differences between the ST and control groups. Statistical analyses (t-tests) of the data in Table 3 supported the lack of significance between the ST and control groups (p=0.3-0.98 for all categories of data).

Discussion

Despite several months of research involving 184 cuttings and several species of plants, we were unable to detect any beneficial effects from SUPERthrive™ on the success rates of our *Nepenthes* cuttings, or on the growth rate of our established *Nepenthes* plants. We cannot exclude the possibility that SUPERthrive™ has subtle effects, but these were not observable in our experiments.

This being the case, why is it that some of the finest *Nepenthes* horticulturists embrace SUPERthrive™ with such gusto? It might be that when horticulturists apply SUPERthrive™, they do so in a way that is beneficial to their plants, and in which the presence of SUPERthrive™ is irrelevant. For example, when a grower plunges freshly made cuttings into a water bath (as in Experiment II), the harmful effects of cavitation are being abated. During the course of this experiment, we learned that a water soak encourages our cuttings to root, so water soaks without SUPERthrive™ are now standard practice for us. Similarly, we learned that weekly sprinklings of water (as in Experiment III) improved the growth of our *Nepenthes*, whether or not SUPERthrive™ is included in the water.

Nepenthes plants have variable growth rates, and this can confound horticultural experiments. For example, in the population of *N.* ×*superba*, we observed a range of growth rates which varied by as much as a factor of 7.7 within the same experimental groups. This variability produced enormous standard deviations in our statistics. They might also fool horticulturists into thinking that a treatment method, which might have no value, is having a large effect.

Acknowledgments: We wish to thank Tim Metcalf and Ernesto Sandoval at the Botanical Conservatory at the University of California (Davis) for graciously providing us materials and greenhouse space for this set of experiments.

From the Board: Splinter Hill Bog Update

Brian Barnes • ICPS Conservation Director • brian@carnivorousplants.org

Hello Friends,

Happy Spring to everyone! As 2009 is already off to a running start, and once-dormant pots are beginning to awaken and grow, let me first start off by offering a heartfelt thank you to all ICPS members who have donated to the preservation of the Splinter Hill Bog Preserve. We successfully met our goal of $6,000.00 in 2008, which has been given to Splinter Hill in support of their wonderful efforts. Most importantly, we couldn't have done it without you, our cherished members.

The Splinter Hill Bog Preserve in Alabama is home to more than 12 species of carnivorous plants, including five species of *Sarracenia,* two species of *Pinguicula,* and several species of *Drosera*. Also, nearby on the Forever Wild Preserve is one of the largest populations of the incredibly rare and endangered panhandle lily (*Lilium iridollae*).

As many of you are aware, prime CP habitats such as this are sadly being lost to bulldozers and poaching at an alarming rate. It's been the longstanding mission of the ICPS to "return the favor," so to speak, for the years of magic, mystery, and awe these remarkable plants have given to many of us. Together, we can make this happen.

The ICPS and The Nature Conservancy are working together on a continual basis to manage this property using periodic prescribed burns and working to control non-native invasive species such as *Imperata cylindrica,* also known as cogongrass. Throughout 2009 and the years to come, the ICPS will continue to support the preservation efforts at Splinter Hill Bog Preserve and other worthwhile projects that protect our beloved CP. We truly are the stewards of these remarkable plants, and their future well-being depends on our continual involvement and efforts. And together, we can make it happen!

Conservational donations can be made from the ICPS Members Only website by clicking the "Donate Now" link on the left of the main page.

Thanks again and... happy growing!

CPN 25 Years Ago

Ricky Maulder told of a personal encounter with *Drosera arcturi* and *Drosera spathulata* [sic] growing in wild sphagnum bogs in New Zealand. When Mr. Maulder came across the owner of one such patch of sphagnum containing these two *Drosera* species, he was told that he may harvest the sphagnum at will since the area was about to be bulldozed to provide grazing land for the owner's horses. It is unfortunate for CP enthusiasts that the native habitats of carnivorous plants are continually being destroyed to provide for the stability of the growing human population.

Literature Reviews

By Doug Darnowski

Plachno, B.J., and Swiatek, P. 2008. Cytoarchitecture of *Utricularia* nutritive tissue. Protoplasma 234: 25-32.

The authors bring together here data on the ultrastructure—the structure seen at the electron microscopic level—and the histochemistry—the chemical nature of the tissues—of the nutritive tissue of several *Utricularia* from various sections of the genus. This nutritive tissue assists the developing ovule, which becomes the seed and is a relatively unusual though unusually well-developed feature in *Utricularia*. What is perhaps most admirable about this paper is how the authors were able to combine light and electron microscopy with biochemistry and then correlate that with the phylogenetics of *Utricularia*. (DD)

Guisande, C., Granado-Lorencio, C., Andrade-Sossa, C., and Duque, S.R. 2007. Bladderworts. Functional Plant Science and Biotechnology 1: 58-68.

The authors present an excellent general review of various features of bladderworts. It is a pleasantly written, clear account of all aspects of these plants, from ecology to phylogenetics, from physiology to cultivation details. The text should be accessible to just about anyone who has done some reading on bladderworts, so anyone looking for a simple but scientific introduction to the genus should read this review. (DD)

Fleischmann, A., Gibson, R., and Rivadavia, F. 2008. *Drosera ericgreenii*, a new species from the fynbos of South Africa. Bothalia 38: 141-144.

A new species of *Drosera* from South Africa honors Eric Green, known to readers of various publications on carnivorous plants for his own occasional writings but even more for the assistance which he has rendered to many of the better-known travelers who have brought stories of the world's carnivorous plants to the rest of us. Three such travelers and ICPS members—Andreas Fleischmann, Robert Gibson, and Fernando Rivadavia—have split off a distinct population of *D. hilaris* from the West Cape with markedly shorter plants and differences in the morphology of leaves and glandular hairs, among other features. This is a much-deserved honor for a carnivorous plant enthusiast. (DD)

Names of Cultivars Registered in 2008

Dionaea 'Microdent' Quenon, Carniv.Pl.Newslett.37:26 (2008) 12.June

Dionaea 'Royal Red' AUPBR 464, Au.Pl.Var.J.7:16 (1994) 20.March

Drosera 'Ivan's Paddle' I.Snyder, Carniv.Pl.Newslett.37:22 (2008) 12.June

Pinguicula 'Down Under' Kibellis, Carniv.Pl.Newslett.37:22 (2008) 12.June

Sarracenia 'Bris' P.D'Amato & B.Rice, Carniv.Pl.Newslett.37:44 (2008) 12.September

Sarracenia 'Hugh Jampton' A.M.Selwyn, Carniv.Pl.Newslett.37:44 (2008) 12.September

Utricularia 'Nüdlinger Flair' T.Carow, Carniv.Pl.Newslett.37:110 (2008) 15.December

Instructions to Authors

Carnivorous Plant Newsletter is the official journal of The International Carnivorous Plant Society. It is dedicated to the distribution of knowledge about carnivorous plants, including information on cultivation, conservation, and related fields of botany. Carnivorous Plant Newsletter thrives only because of a steady stream of material from its readership; members of the Society are encouraged to submit articles.

It may take up to a year or more for a contribution to be published, and any manuscript may be edited to some degree prior to publication. Concise and clear writing will result in the minimum number of editorial changes. Authors will be contacted only if the editorial modifications are significant. If your manuscript is a scientific work, the editors may request external peer reviews. If certain external peers should be excluded from the reviewing process, this must be stated in a cover letter.

Follow these guidelines when submitting contributions:

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- Include a list of the names of all the authors.
- Provide an email address for the author who should be contacted if we require more information.
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- Full citation of all references quoted in the text must be provided in a section following the text of the manuscript.
- All illustrations, diagrams, and tables must include descriptive captions. Include these captions at the end of your manuscript. For format style, follow the examples of recent articles in the Newsletter.
- Contributions should be submitted on a CD, 3.5-inch disk (PC format), or by email. You should also send a hardcopy of your documents to ensure your tables or special character accents are reproduced correctly.

All Submissions:

- All submissions must be in electronic form.
- Computer files should be in Microsoft Word (.doc), rich text format (.rtf), ASCII text (.txt) or sent in an email.

Images and Artwork. Quality photographs and original artwork may be submitted. High quality electronic images are best. Slides or prints are acceptable, but will not be returned, so only submit duplicates. Color illustrations are expensive to publish, so we may not be able to use all your photographs or we may print them in black and white.

- Photos should be submitted electronically.
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Other Items:

- Manuscripts which report upon field trips or activities that involve field collection should specify the permits that were required to allow the work to be completed. If no permits (beyond, for example, simple park access passes, etc.) were required, a simple statement to that effect can be substituted. This information should be included at the end of the article, along with other "Acknowledgements", if any. Examples are: "No special permits were required to visit the sites described in this paper", "Permission to visit this site was given verbally by the owners," "Permission to visit this site and collect plants was granted by Lassen Volcanic National Park, permit #LAVO-2005-SCI-0009."
- All material submitted for publication must be original and unpublished.
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